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The American Biology Teacher

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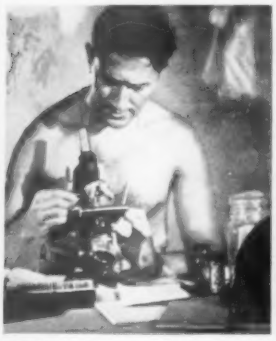

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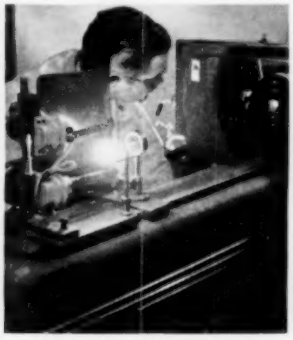

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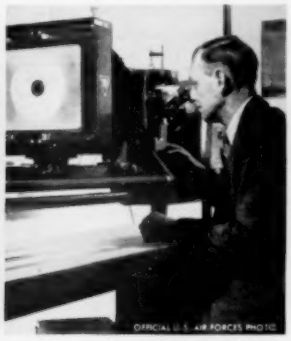

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The American Biology Teacher

Vol. 7 DECEMBER, 1944 No. 3

Clay Models for the School Museum

GERTRUDE S. EVANS
William Waldo Blackman Laboratory, The New York Medical College

Objects of biological origin may be copied in clay. The Egyptian beetle supplied the idea for the scarab, of which millions have been made. Studies may be made of normal size, or reduced or enlarged. Besides furnishing museum specimens, these contribute to the student's growth. How often do we hear "I simply cannot draw!" Pottery can be the unconscious route to drawing as well as leading to sculpture and chemistry.

Technique[1]

Clays are different in color and properties. Usually those in the commercial market have been subjected to chemical analysis, so that firing time and temperature are known. Small quantities of the prepared clay will keep moist and ready for use in a covered crock or glass container. It is shipped in 100-lb. covered wooden buckets, or less amounts, and kept moist with a damp cloth after being exposed to air.

[1] The writer will gladly answer questions concerning this and other points.

A lump of clay is "wedged" by kneading and throwing on a hard surface to exclude all air; this leaves the clay solid but pliable. A piece of wire (preferably copper) is fastened to a wall or back of work table so the wire is held taut and obliquely. After the clay is kneaded, it is cut in half by pressing the clay on the wire; each half is then thrown on the table, one on top of the other. It is kneaded again, cut and thrown again and again until the cut surface is smooth and pasty, indicating the absence of air (which would cause the clay to burst when fired).[2]

When the clay is in suitable condition form a short cylinder by rolling between the palms of the hands. Then on a flat, smooth surface, press and roll gently, until the cylinder is lengthened to a "rope" or "coil." Practice makes the coil even and of a thickness adapted to the size of the object desired. Prac-

[2] Pueblo Pottery Making, No. 6. Denver Art Museum, Denver, Colorado, August 1936, 10¢ per copy. Gives excellent illustrations of manipulation and technique.

tice by making a hollow cylinder (vase), starting the base from the center, like a watch-spring. The first upward coil is added to the base even with the outer edge, worked into the base with thumb inside and forefinger outside, and pressed into shape outside, so as to start the walls of the vase in the desired form. Continue the coils up to the desired height, keeping the outer surface as smooth as possible. A straight-edge, or piece of cardboard, held against the sides of the vase, can be used as a "templet" (template) to keep a symmetrical form. A cardboard circle of the same size as the base which will indicate the same periphery is laid on top of each new coil as it is added. The last coil is smoothed into the desired form, and the vase is ready for drying.

There is a time in the drying that is called "leather dry," when the surface is in best condition for smoothing and cutting. Water and a small sponge should be at hand, to counteract dryness during the course of working. The unfinished object is kept in a closed receptacle or in a damp cloth; when the work is completed, it is allowed to dry thoroughly before being fired.

Tools can be as simple as a boy fisherman's pin-hook, a manicure stick or a sewing needle. Various tools can be obtained from firms that supply clays, glazes, etc. Fingers have always been the best tools because they convey sensations of tactile values.

Having learned to control the medium, one may attempt museum specimens. A beetle, wing, or leaf may be an interesting beginning subject. Children's toy shops sometimes have small inexpensive kilns for firing small objects. Colored with glaze applied delicately, using a fine brush, and fired, these objects may be actual jewels.

Whether complicated museum specimens are wanted, or simpler ones for a classroom exercise, the question of finish will arise. In the classroom, clay models can be made quickly and dried but not fired. These will teach details, and the models can be crushed and the clay used again after wetting and kneading. Models may be painted when thoroughly dry, but the best ones for permanent use are glazed and fired.

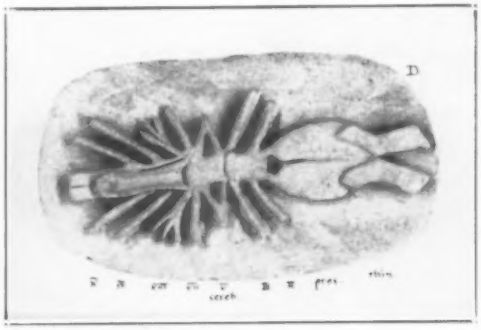

FIG. 1. Model of the dorsal side of the brain of the lung-fish *Ceradotus*, in relief on clay tile. Design adapted from Parker and Haswell.

SUBJECTS

For such objects as heads of birds, showing beak adaptations (duck, chicken, pigeon, and the like) use actual bird heads if available; good pictures in textbooks or manuals may of course be used. Solid models may be made, or, using a flat clay tile, the design may be incised, giving a diagrammatic or schematic effect. This is useful for such as ecological maps. Or elevated (bas-relief) on the tile, flowers and insects may be tried. To save time, the clay coils or tiles may be ready for distribution at the beginning of the period. The effect of a fossil imprint may be shown by pressing the paw of a kitten or other such object into the clay. Insects may be imbedded in the soft surface, leaving their impressions. Tiles showing phylogeny may be valuable, and a series of them is both educational and ornamental. Clay utility jars with covers, clay spoons for chemicals and plates

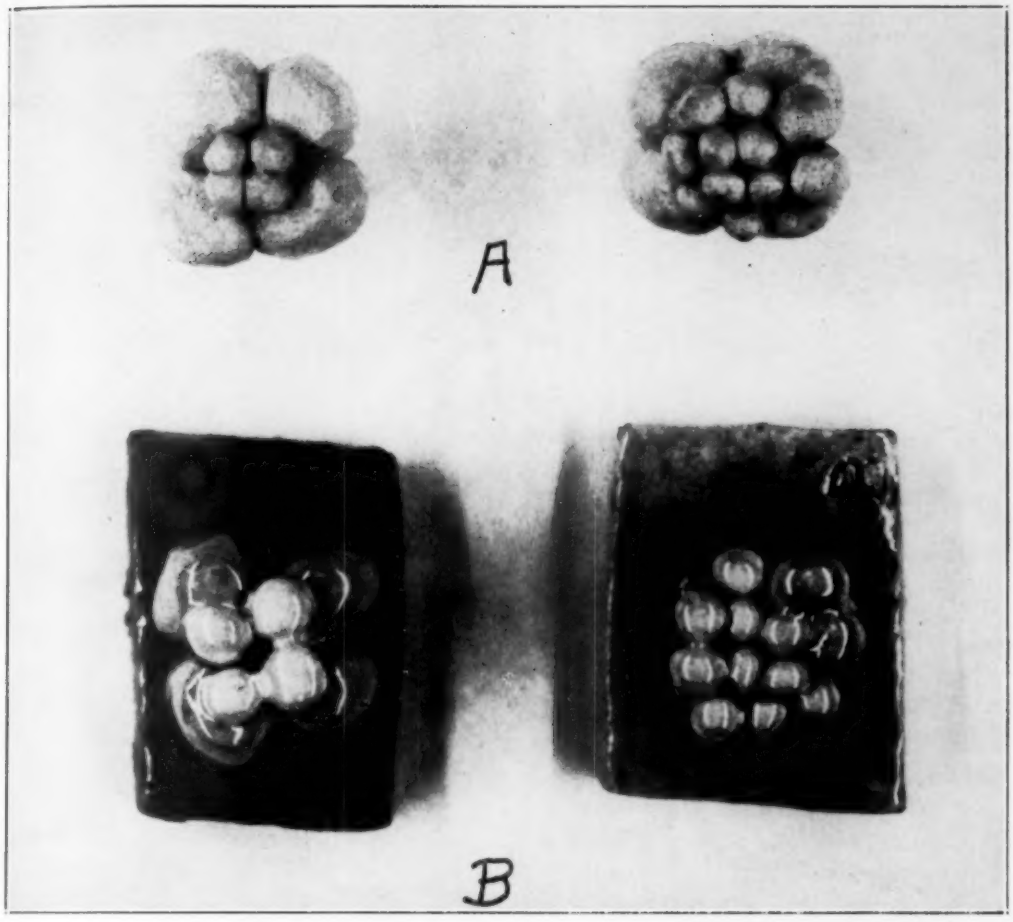

FIG. 2. Vertical views of 8-cell and 16-cell stages of embryo of the sandworm *Nereis;* A—unglazed clay, B—glazed and fired. The glazed models are in two colors, which add much to the appearance of the model.

for specimens—making these at home will teach manipulation and save school time, also economize metal war materials. Tiles of kneaded clay, patted to oblong shape, are useful. For a tile box, fasten two strips of wood, one-half inch thick, about three inches apart, to a flat surface. Close the ends with short pieces of the same thickness, thus making a box of the desired size and one-half inch deep. Sprinkle the interior with clay dust or flint. Fill and press the kneaded clay into this box even with the top. When the clay is dry, remove one of the sides or ends of the box and release the tile, using the blade of a knife if necessary. Shrinkage usually releases the tile from the side strips.

For impressions or incisions, use a small piece of clay to test best condition, allowing at least ten minutes for settling. Insects should be imbedded as soon as the clay has settled. Good and important impressions can be used as moulds after firing. A tracing of a design may be used on leather-dry clay; with experience a design may be incised in dry clay, with the "incisor" kept wet to prevent uneven edges.

For bas-relief (raised designs) apply design by tracing or drawing. Keep the clay moist and remove the background

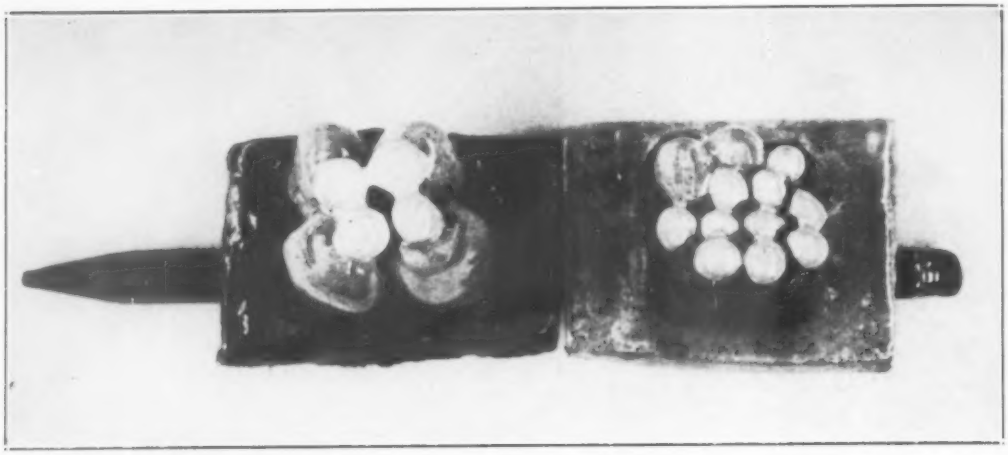

FIG. 3. "Three-quarters" view of 2-A; the pencil gives a measure of the size of these particular models.

material with a modelling tool. Build up the design by adding clay; before adding new clay, make scratches on the surface to be covered and wet slightly, so the new clay will adhere.

For "modelling in the round" take a lump of kneaded clay and shape with the fingers, adding or removing as necessary; for additions use "slip," which is thinned-out clay and water. Plaster-of-Paris bases, or "bats," convenient to model on, can be made in a small pie-plate. These absorb excess moisture, and do not adhere to the clay.

For color, use paint or glaze. Oil paints, with a little turpentine, may be applied to the dried or fired clay. Water colors will do for temporary work. Apply underglaze and overglaze colors to fired objects. These do not show the color until firing, so that small test pieces are processed and then the model treated similarly. Manufacturers have color charts; 25 test packages, enough for a year's work, can be bought at a small cost ($1.00 to $1.50). Some knowledge of chemistry is helpful in using independent glazes and in experimentation. In using lead or tin glazes, protect the skin and do not inhale the dust.

SILVER BURDETT COMPANY announces the appointment on November 1, 1944, of Mr. G. Dan Robison, Jr., as Eastern Sales Manager with headquarters in the New York Office. Mr. Robison has been sales representative in Tennessee for the past nine years, with sales responsibilities also in several neighboring states. Formerly he was a teacher in the Paris, Tennessee High School. He received his undergraduate training at Cumberland and his graduate work was done at George Peabody.

THE SCIENCE TALENT SEARCH, sponsored by *Westinghouse*, is again under way. The $11,000 in scholarships, which are awarded each year to the finalists, can be applied to any accredited college or university in the United States which is approved by a scholarship committee named by Science Clubs of America. Scholarships awarded to finalists who enter military service will be held in trust until they return to civilian life.

HOMER M. HIGHTOWER, 34 Ruth Street, Hammond, Indiana, has prepared an outline chart of the plant and animal kingdoms, which comes folded and punched to fit into a laboratory notebook. For information, write him at the above address.

ALFRED M. ELLIOTT, State Teachers College, Bemidji, Minnesota, has prepared sets of zoology and botany plates, charts in miniature, punched for a standard notebook. For information, write him at the above address.

SUGGESTIONS FOR A SPECIAL ISSUE on *Laboratory Aids and Substitutes* are in order and welcome.

Appreciation Through Classroom Organization

CHARLES W. GOUGET
Austin High School, Chicago, Illinois

Appreciation

Few of our children will ever appreciate an orange in the same way as those of us who received an orange on our birthday when we were children. Few of us today appreciate the electric light until it becomes necessary to use a candle for an extended period of time. A healthy person seldom appreciates good health to the same degree as a person who has suffered the inconvenience of poor health first. Conveniences that are always with us are usually little appreciated by most individuals. From this standpoint we cannot hope for a great deal of appreciation among our young folks for conveniences that they have had all their lives. Appreciation seems to be a relative value which is realized most fully in terms of what we have not, rather than in terms of what we have. Herein lies one of the chief weaknesses of our educational systems, *i.e.*, the lack of individual appreciation. Instead of being something that should be sought after by most individuals, education is often accepted in the category of a bitter pill which is forced upon the individual against his will.

Because of this more or less universal attitude among students a teacher often starts his course with one strike against him, so to speak, which he may overcome in time by clever appeal and dynamic interests which eventually lead to the proper appreciation of the subject matter. However, appreciation usually cannot be achieved in a haphazard manner even though the subject matter itself may have intrinsic interest. Appreciation implies orderliness, organization and coordination in classroom management. It is like the momentum that carries a wheel beyond dead center; it maintains enthusiasm at a high pitch. Anything that makes for physical or mental confusion will surely miss the mark of appreciation.

Appeal

Appeal involves curiosity plus enough latent interest to make for potential appreciation. Few people can avoid the appeal of a charming personality, a pretty picture or a pleasing tune. The number of times a book is read by different people may depend on the appeal of its cover. Other things being equal, that automobile will sell best which has the most pleasing body design.

In a like manner a course may be interesting or uninteresting according to a teacher's ability to sell his subject to his students. They must be shown objective proof of accomplishment by other students as a measure of past interest in the course. The proof may consist of a demonstration of worthwhile projects completed during the past semester. Such a demonstration may arouse a competitive desire in the new class to exceed the work that has already been done. At this point the appeal becomes positive instead of negative.

The initial appeal depends largely on the teacher's personality plus his method of presentation. He must act alive and his presentation must be objective and dynamic. Presentation by a "sleepy"

personality with a monotone voice is bound to lose attention at the outset. Any appeal that the subject matter may have within itself is immediately lost because the presentation is not stimulating enough to keep the students awake.

Teachers should remember that fundamentally human beings are objective-minded. Advertising in store windows and in catalogues and magazines should be enough proof of this truth. Who among us can resist the stimulating effect on the appetite of a colored picture of a golden brown roast and brown potatoes? Such a picture can easily form our decision to eat at the restaurant advertised. However, a decision may be reached a great deal more quickly if we happen to pass the same restaurant and see the same roast and brown potatoes in the window. The thing in the "flesh" is always more convincing than a picture or a diagram, or even the references to authority on the subject. We are beginning to recognize this fact more and more in modern visual education methods in our schools.

Often the spectacular or the unusual may command attention at the start but it will not maintain attention or interest over any extended period of time. The cover of a book may furnish the incentive to a reader to find out what is on the inside, but what is on the inside may not justify the cover or vice versa.

Interest

Curiosity captivates attention. It is the "spark" that starts the "wheels" of interest moving, so to speak. Attention may be obtained by something spectacular, but when the spectacular fades into the background, interest can be maintained only if that which follows is within the experiences of the person participating. In other words, interest involves a certain amount of understanding. If the subject matter is too abstract or involved, or if the procedure moves too rapidly interest will sooner or later get stalled on "dead center" and the activity becomes purposeless.

From the standpoint of maintaining interest it is usually good procedure to build a course around a more immediate objective than that usually intended in the ultimate use of the material in life. In other words, all values cannot be "bread and butter values" even to the extent that they may be used at home or out of school sometime in the immediate future. Sometimes when an activity becomes too purposeful without proper development it loses its appeal, and ultimately its interest. Much human activity is merely activity for activity's sake with no particular purpose behind it. Young children seem to enjoy distributing their toys from one room to another without any serious thought of playing with them in any room. The activity of getting the toys out seems to be the pleasing part of the game. However, when the same kind of activity is required to put the same toys away to keep the house tidy the child is no longer interested in the more definite purpose. Teachers can make use of this fundamental characteristic of human nature to provide a more or less secondary purpose in the classroom work. The purpose should be immediate and as objective as possible. Such a purpose will maintain interest by activity, some of which has little actual purpose, but which helps to maintain the student's interest in the work. True interest usually results from individual or group contributions to some general plan laid out by the teacher in which the most gifted and the least gifted student may contribute according to his or her ability.

Classroom Management

Proper appreciation in any course cannot be obtained amid noise, disorder

and confusion. Appreciation implies a certain respect for the teacher as well as application to the task at hand. Without either appreciation is almost certain to be lacking and all values disappear. Students are quick to sense frustration on the part of a teacher. Usually the teacher himself is aware of the fact that things are not moving as they should, but he may not know how to correct the difficulty. There is usually an apparent lack of interest and serious purpose on the part of the students; materials are lost frequently, and this leads to more confusion and uncertainty.

Organization is the secret of successful teaching in our modern high schools with their mass education methods. It is especially true in laboratory courses in which hundreds of materials must be used each day with a minimum of loss and breakage. Such materials should be classified, grouped and filed so that they may be found in a definite place at a moment's notice, and with a minimum of uncertainty and confusion. Uncertainty on the part of the teacher leads to disorder on the part of the students.

Every effort should be made to make a classroom procedure as calm and quiet as possible. The classroom method must be routine for young students so that each one will finally find out what part he must play in the organization set up. Each student must be responsible for the materials he uses so that the supply will not be depleted needlessly. A system of seat numbering with corresponding numbers on materials will help a great deal to fix responsibility and aid in checking materials quickly at the end of a period.

Most high school students appreciate good classroom management because they usually have a more clear idea of what is expected of them. They know the general procedure for the week; they know their work will be checked systematically by the teacher; they know they must apply themselves to do their best work; and they know they are responsible for the materials they use.

Definiteness and system are reflected in the neatness and order in the classroom when confusion is reduced to a minimum, because many students will take pride in doing their share of the work. Pride in the classroom itself will lead to greater enthusiasm about the subject matter, with a desire to do additional work relating to the regular assignments. When a student can point to a piece of work and say, "I did that, that is mine!" he immediately becomes an integral part of the classroom set up. At this point the momentum of appreciation is having its effect.

Appreciation therefore is determined to a large extent by the ability of the teacher to know his students; to be able to provide purposeful work that they are capable of doing efficiently at a rate suitable to their particular speed; to be able to present that work in such a way that each step points in a definite direction understood by all in a well rounded systematic development.

BY THE WAY

GERMINATION TESTS of various types of seeds are excellent winter exercises. Use blotting paper, flannel, cotton, sand, sawdust or any other suitable medium; be sure you keep this medium *moist*, but not *soaked!*

THE UNITED STATES DEPARTMENT OF AGRICULTURE, also many state departments, have many free bulletins that are most useful to the teacher of biology. Write for a list of these, either to the Departments involved, or to your congressman or legislator.

FROZEN GROUND in winter is by no means devoid of life. After the surface soil is frozen hard, bring a chunk of it into the laboratory and allow it to warm up gradually. Many forms of life, which were dormant, will become active as the temperature increases.

A Biology Reference Shelf

DONALD S. LACROIX
Amherst High School, Amherst, Massachusetts

Every biology class should have a reference library or at least a shelf of books that can be used at a moment's notice. To place all biology reference material in the main school library is a mistake as it involves too much time and travelling to look up material on short notice. If there are some good books right in the laboratory, material can be looked up on the spot with a minimum of time and effort. For instance, a pupil discovers several types of mixed protozoans under his microscope. He wants to know what they are right away. A book at his immediate disposal answers his questions then and there. Undoubtedly there is much value in sending boys or girls to the main library to spend a period or two in research for a special report to the class, and this type of work should be encouraged, but for quick, easy, and efficient "spot" news, a handy bookshelf is ideal.

It would be most desirable to have a hundred or so well-recognized biology books at the disposal of the pupils, but this is beyond the fondest hopes of teachers in many small schools, so we must content ourselves with a minimum of books.

What books? By all means stock the biology laboratory with at least one copy of each of the newer secondary school biology textbooks, such as *Dynamic Biology for Today* by Baker and Mills (Rand McNally); *Biology for Better Living* by Bayles and Burnett (Silver Burdett); *The Biology of Flight* by Fitzpatrick and Stiles (Macmillan); *Biology* by Moon and Mann (Henry Holt); *Biology for Today* by Curtis, Caldwell and Sherman (Ginn); *New General Biology* by Smallwood, Raveley and Bailey (Allyn-Bacon); *Everyday Problems in Biology* by Peiper, Beauchamp and Frank (Scott, Foresman); *Life Science* by Hunter (American Book Co.); *Science of Living Things* by Weymouth (Henry Holt); *Biology and Human Affairs* by Ritchie (World Book Co.).

An old stand-by which will help a lot in identifying water-inhabiting forms is Ward and Whipple's *Fresh Water Biology* (Wiley), as is Dr. Ann Morgan's *Field Book of Ponds and Streams* (Putnam). As a matter of fact the whole Putnam series of *Field Books* is most valuable—the one on *Animals in Winter* also by Dr. Morgan; *Field Book of American Wild Flowers* by Mathews; *Field Book of Common Ferns* by Durand; *Field Book of American Trees and Shrubs* by Mathews; *Field Book of Insects* by Lutz; *Field Book of Seashore Life* by Miner. *Birds of America* by Pearson *et al.* (Garden City Publishing Co.) is an excellent reference book with its many colored plates, photographs, and full descriptive material.

The National Geographic series on fishes, birds, animals, and flowers is an excellent set to have. The magazine itself should be in the main school library.

The Yearbook of Agriculture (published by the U. S. Department of Agriculture) for 1936, 1937, 1938, and 1939 cover heredity in plants and animals, soils and food (nutrition in humans and animals). These may be available through your Congressman or may be purchased from the Superintendent of Documents at Washington, D. C.

The 4-H Club Insect Manual (U. S. Department of Agriculture Miscellane-

ous Publication 318) is an excellent reference on insect orders, collecting, preserving, and mounting, as well as suggestions for control.

The General Biological Supply House, Chicago, Illinois can supply teachers with their famous *Turtox Service Leaflets* which cover many projects, experiments, and laboratory procedures.

A good encyclopedia is a nice addition to have, but in smaller schools it may be necessary to forego such an expensive set of books and use the ones in the main library.

Permanent scrap-books are commonly made up by the pupils themselves and cover many of the current articles and pictures from newspapers, magazines, and advertisements.

The individual teacher will be able to stock the reference shelf to suit local needs, but the suggestions made above will serve to show how useful a few books can be if they are near by.

Using the Biology Reference Shelf. Photo by Lacroix.

A METHOD OF QUIETING PARAMECIUM FOR OBSERVATION[1]

The polyvinyl alcohol method of quieting paramecium and other microorganisms is not new, but it is probable that many readers of THE AMERICAN BIOLOGY TEACHER have not had it brought to their attention.

A solution of completely hydrolyzed, medium viscosity *polyvinyl alcohol* is prepared by stirring the powdered alcohol[2] into water until the solution is as thick as heavy molasses—approximately 12 to 14 grams of dry alcohol in 100 cubic centimeters of water. This should be done over a steam bath and the solution left until all bubbles rise to the surface, after which the solution will be glass clear, and may then be kept indefinitely in a stoppered wide-mouth bottle.

In use, two drops of a thick suspension of paramecia or other similar microorganisms are placed on a slide and two drops of the polyvinyl alcohol solution added. The whole is thoroughly stirred with a needle and covered with a cover glass. The animals are brought almost to a standstill at once and will remain so in good condition for over four hours. Abrupt and striking reversals of ciliary beating and many other details are clearly visible. The frequency of pulsation of the contractile vacuoles usually becomes slower after three hours. The cover glasses are self-sealing because the polyvinyl alcohol dries to form a firm membrane that prevents further evaporation. The slides can be cleaned merely by soaking briefly in water.

Stentor presents a handsome object when immobilized by this method. The same holds for the larger hypotrichs and various small aquatic worms like *Nais* and *Chaetogaster*.

G. B. MOMENT,
Goucher College,
Baltimore, Maryland

[1] Reprinted, in part, from *Science*, Vol. 99, p. 544, June 30, 1944.

[2] Type B, Grade RH-349-A, obtained from E. I. duPont de Nemours Company, Electrochemicals Department, Niagara Falls, New York. Other grades of the alcohol can be used, but they go into solution with more difficulty and remain cloudy in solution.

Editorial Comment

On July 1, 1938, THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS came into existence. Delegates from thirty-five states, representing some 1500 people interested in biology education in high schools over the country, were present.

Among the purposes and aims for this organization, worked out at the first meeting, was one which needs some emphasis. "[To] make available to high school teachers; information concerning the selection, organization, and presentation of biological materials; and to advance and strengthen the relationships of the subject to other sciences and to education as a whole."

In short, biology teachers are as much educators as teachers in any other field; they deserve the support of a professional organization devoted to their field. Many who are teaching biology in our schools are primarily interested and trained in some other subject. The writer knows of many instances where biology seems to have been an afterthought in the curriculum. In some states where one year of science is required for graduation, biology has been selected for the rank and file of pupils and required of every student in school. As a result, there are many unsatisfactory grades. This would have been the case with physics, chemistry, or physical science had they been required of the rank and file.

Often a regular biology teacher is not hired to teach biology; often the classes are divided among teachers of other subjects who have a free period, and who, because of a teaching license in some science or related subject, has a legal right to teach biology. Incidentally, it is often possible to hold a license without much knowledge or training in biology.

We cannot condemn these teachers. They are usually doing their job conscientiously and well, considering that they may be handicapped by lack of a burning enthusiasm in their subject and by the fact that they are not too well informed in its matter. In their busy life there cannot be much time to make up this lack of information by usual channels of study and research.

Physics and chemistry have not suffered in the curriculum exchanges; when the present war crisis came both of them were more ready to fall into the training program of our boys who would soon go into service for their country. Why? Partly, at least, because they had organizations of long standing and were already respected components of the high school currriculum. In physics and chemistry we generally expect to find a more or less selected group; students who are expecting to go into scientific professions. But why would it not be as logical to require one of these physical sciences, and select only the scientists for biology? After all, who uses more basic biology than the physician, the surgeon, or the psychiatrist?

We must not blame physics and chemistry for their splendid efforts nor their strong veteran organizations that command respect for their fields. There has been no intention on their part to hinder the progress of any other branch; they have merely taken advantage of their opportunities, and created opportunities when they could. Biologists themselves are the ones who deserve blame, for they have neglected to foster and protect the interests of their field in the high school curriculum shuffle.

But there were a few who did realize what was happening, and when in 1938 the Association was organized and its

principles drawn up, a good deal of enthusiasm was exhibited. Now the organization is strong enough to begin to make those principles functionable.

There is still a lot of "missionary" work to be done; the brunt of the effort has, in the past, been borne by a relatively few of the membership. Now, if we are going to continue to grow and to increase our effectiveness, new loyalties on the part of teachers everywhere must develop; this must be so if the good of the organization is to reach all who teach biology. Many in smaller schools, where the problems mentioned earlier are most pressing, have not yet made the contact with the parent group. If individual members will form locals and do the "missionary" work, help get the National Association into touch with local problems, bring the non-biologist teacher of biology to meetings, and advertise The National Association of Biology Teachers, then greater benefits will result for every individual teacher.

Here is how some of these benefits occur: First, in the problem of materials, someone in the Association has the answer to your problem, and you can help someone else.

Second, in November, 1943, a committee was selected and charged with the duty of collecting the activities of members and of local groups for the purpose of dissemination and permanent record. Not a great deal has been accomplished, but some have responded by sending in ideas and records.

In the third place, if membership in the National Association becomes large enough we should have sufficient means to pay a clerk to keep a file of materials which would be available to all. Also, we hope that in time it will be possible to extend financial aid to locals, or even to individual members for certain projects.

Next, comes a suggestion from several members, via Dr. Jeffers and Mr. Russell, that we should maintain a placement service; this is one of the most practical suggestions of all, and will be possible if and when enough contacts are made.

We could go on and name many other ways in which the aim stated at the start of this article will be realized, but the imagination of the reader can grasp the possibilities. I am optimistic that we shall develop and be able to offer greater service, when I think of the splendid efforts of so many in the past and when I discover the new loyalties that are awakening.

Prevo L. Whitaker,
President-Elect

THE DIRECTION OF BIOLOGY TEACHING IN CLEVELAND*

Mr. Chairman and Fellow Biology Teachers: I wish to convey to you greetings from the Biology Teachers of Cleveland and especially from those who belong to the Greater Cleveland Biology Club. In September *The National Association of Biology Teachers* will hold a meeting in Cleveland, and we will be glad to welcome all of you to our city.

Now to the subject upon which I am to speak, "The Direction of Biology Teaching in Cleveland." By way of background it is well to know that in Cleveland biology is a five period per week subject and a tenth grade subject, and that fact colors somewhat our procedures. Another local characteristic is that each of the fourteen senior high schools, 10th to 12th grades, are individualistic. Each is set up without any uni-

* Presented before the Regional Meeting of Biology Teachers, sponsored by the Biology Teachers Club of Southwestern Pennsylvania, Pittsburgh, Pennsylvania, July 4, 1944. A few sentences have been omitted because of shortage of space.

form method of procedure in administration, with the result that a teacher transferred from one school to another in Cleveland feels as though moved to a different city. This has its bearing on all teaching procedures and hence there is no general agreement as to what should be taught in high school biology or how long should be spent on a given topic. All this in spite of a city course of study and some carefully prepared syllabi in certain biology topics from the former curriculum center. In one item there is uniformity in that all schools use the same textbook, Baker and Mills, *Dynamic Biology*, the new edition. Available for all our high schools is the Cleveland Museum of Natural History and the Cleveland Health Museum.

Cleveland, it appears, is committed to separate subjects in high school. There is no movement toward integration of subject matter fields in the high schools at the present time, even in science. True, we do have what we call "Senior Science," or high school physical science. But nowhere has it been suggested that biology topics be included and so make a course in high school science. In most Cleveland high schools it is felt that senior science is for those who find physics or chemistry too difficult.

Peculiarly, while each high school goes its way more or less independently as to what other schools are doing, there is in certain schools quite a bit of stereotyped biology teaching. By this I mean the lesson assignments, tests, and teaching aids are rigidly laid out by the department and all teachers follow the same schedule. In other schools, each teacher does the planning and all those things connected with the teaching procedure, even to the extent of giving no department tests. There are at present no city wide tests given in biology.

There is a strong tendency to do away with laboratory work and field work because of time limitations, because excessive use of the microscope is wasteful of pupil time, because dissection is loaded with too much technical detail, and because the conducting of field trips on city streets or to distant parks is, also, wasteful of pupil time. To take the place of laboratory work, demonstrations are used, but in some places this even is lacking in part, so that there is almost a book course, supplemented with pupils reports on various topics.

Another tendency in our teaching is one that the present war has brought to the front, the making of our biology course one in Health only, with First Air thrown in. One of the directives given Cleveland biology teachers in 1942 by the science supervisor told us to sacrifice any biology topic we wished in order to get time to emphasize health materials. In some schools five or six weeks were taken from biology to teach the Red Cross course in First Aid. As biology teachers, should we see that these topics be put in a place by themselves and called by their right names?

In Cleveland high schools extensive use is made of classroom movies. This is due to our Educational Museum, that buys films for use in all schools; also, we can get these films on order. All that is desired is not attained by this scheme, but we do get biology films. Hence, it is so easy to let the films take the place of laboratory work and even demonstration materials. The future probably will bring no curtailment in this teaching aid.

In all Cleveland high schools class rooms are equipped with radio. There is a growing movement to broadcast from our school station, WBOE, more science programs. The past two years this has been confined to science dealing with aviation or with the war. This material was used mainly by physics, chemistry, and senior science classes. In the future there is no doubt that this will be ex-

panded to include more biology. Last year there were some rebroadcasting of the University of Chicago science programs. Some biology teachers used the series of talks on *The Doctor and Health* set up for junior high school science classes.

The War has caused, during the past two years, an upward extension of the school garden program from the grade and junior high schools into the senior high schools of Cleveland. These are individual gardens, usually according to a set plan, with supplies furnished at cost by the garden department of the school system, although a pupil may plan his own garden and get his supplies elsewhere. These gardens are visited and the pupil advised regarding his garden twice during the summer months, once at the close of school in June, and again in August. For high school students having gardens this visiting has usually been performed by a biology teacher. Gardening gives many city students their only contact with living plants and the care required to have them grow successfully.

Now, while we are becoming less scientific in our biology teaching, the paradoxical thing is that we are to teach the scientific method, or as some call it, critical thinking, as something that will be useful in any walk of life our students will follow when school days are over. Several directives on this subject have been given Cleveland science teachers, both from the science supervisor and from a former assistant superintendent in charge of the senior high schools.

These, then, are some of the tendencies that appear on the horizon as to the way biology is going in Cleveland. How long these tendencies will remain, time alone, can tell.

VINCENT R. PETERSON,
Glenville High School,
Cleveland, Ohio.

WALKER PRIZES IN NATURAL HISTORY

FOR ESSAYS ON MAMMALS

Two prizes, founded by the late Dr. William Johnson Walker, are offered annually by the *Boston Society of Natural History* for the two most acceptable papers written in the English language, on a subject chosen by the Board of Trustees of the *Society*.

PRIZES: A prize of sixty dollars may be awarded to the author of the best essay. This award may be increased to one hundred dollars, at the discretion of the judges of the contest, in the case of a paper of exceptional merit. A second prize of fifty dollars will be given only if the next best paper seems worthy of the distinction. No prize will be awarded unless the papers submitted are deemed worthy by the judges.

ELIGIBILITY: The competition for these prizes is not in any way restricted.

SUBJECT MATTER: Each paper must be the result of original and unpublished research personally conducted by the author and accompanied by an accurate bibliography and a review of general literature on the subject. All papers must be typewritten and in complete form for publication. Other things being equal, preference may be given papers showing evidence of preparation especially for this competition.

AUTHORSHIP: Each paper must be anonymous. It must bear a pseudonym placed in a conspicuous place on the first page. A sealed envelope, also inscribed with this pseudonym, must accompany the manuscript. The contents of this envelope will divulge the identity and address of the author. Anything in the essay which shall furnish proof of the identity of the author shall be considered as debarring the paper from competition.

CLOSING DATE: All competitors must submit their work to the Acting Secretary, *Boston Society of Natural History*, 234 Berkeley Street, Boston, Massachusetts, before May 1, 1945.

The *Society* and the judges assume no responsibility for publication of the winning papers. However, it is understood that authors should not publish their papers until after the announcement of the prize awards at the Annual Meeting of the *Society* in October, 1945.

MARGARET BAKER,
Acting Secretary

ATTENTION LOCALS

Send notices and reports of meetings as promptly as possible. Records of organization, names of past officers, etc., are also useful. THE AMERICAN BIOLOGY TEACHER wants to hear from all of the local organizations, so that news of their activities may be published. Write now to

PREVO, L. WHITAKER,
University High School,
Bloomington, Indiana

A METHOD OF MOUNTING GUARD CELLS

A laboratory teaching method in use in Lakewood High School was stimulating to me as a new member of the department, and I wonder if others might not find it useful. Instead of the usual stained slides designed to show the lower epidermis of leaves, we use freshly prepared ones which are far superior in showing the normal appearance of guard cells.

After trying various plant materials such as Wandering Jew and Geranium, we found the best results with the ordinary garden pea germinated in a pan of sand.

The mounting procedure is simple. After removing a leaf portion, it is placed flat in its normal position on a glass slide. Then using a small knife, we scrape carefully with a sideways movement to remove the upper and middle cell layers until the clear, transparent, skin-like lower epidermis is left. With a drop of water and a cover glass the mounting is completed in the usual way.

The plump, turgid guard cells cause the stomata to show clearly; and the green chloroplasts within contrast sharply with the clear, well-defined epidermal cells.

Perhaps this suggestion is old stuff to many, but it was a thrill to see for the first time the normal appearance of guard cells instead of the usual stained, prepared ones. In addition, it affords an experience for the student in preparing his own slide.

RALPH ROOD,
Lakewood High School,
Lakewood, Ohio

DEVELOPING AUDIO-VISUAL PROGRAM

Specific recommendations for the development of audio-visual programs in schools and school systems have just been released by the American Council on Education in its publication *A Measure for Audio-Visual Programs in Schools.* These basic statements are an attempt to outline a comprehensive plan for the development of programs on all organizational levels — individual building, local school system (county, city, and town), state department of education and state institutions of higher education. The recommendations indicate the desirable interrelationships of the various levels as well as their specific functions. They set a high standard —one that is far in advance of most present programs—yet they can in no way be called visionary.

The recommendations are offered for the consideration of those school systems which have organized departments of audio-visual education as well as those which plan to inaugurate or expand such departments. For the former the recommendations will be a measure of the present effectiveness and completeness of the local program; for the latter they provide a framework upon which to build.

As a part of a study carried on last year the Council went directly to teachers to secure information on current problems affecting the extent and kind of use made of educational motion pictures in the classroom. Part II of *A Measure for Audio-Visual Programs in Schools* discusses these problems as they emerged from interviews with teachers in six cities. The information compiled through these interviews pointed directly to the need for a set of basic recommendations and indicated also the desirability of making such recommendations in the broader field of audio-visual education.

A Measure for Audio-Visual Programs in Schools was prepared by Helen Hardt Seaton for the Committee on Visual Aids in Education. It is available from the American Council on Education, 744 Jackson Place, Washington 6, D. C. for forty cents a copy.

International Biology*

G. W. JEFFERS
State Teachers College, Farmville, Virginia

When we speak of science and warfare we are apt to have physics and chemistry in mind. Rarely do we associate biology with warfare beyond its relationships with the more or less salvage operations of medicine. Nevertheless, in spite of its high degree of mechanization modern warfare still remains essentially a contest between human beings.

We Americans are wont to "put things in the saddle" and to overglorify the machine. Not that we would detract from the importance of machinery in warfare, but we should bear in mind that ultimately it is the "man behind the gun" that counts.

I should like to call to your attention a small segment of available material that is for the most part being overlooked in current biology teaching.

It seems to me that no better approach to the world of tomorrow has yet been advanced than that revealed from the study of science in general and biology in particular. For example, consider the intriguing possibility suggested by President Karl Compton in the *Rotarian* magazine a few years ago. I am not quoting him directly, but his reasoning went somewhat like this: Until a few generations ago, there were only two primitive recipes for securing the good things of life. One was to work hard and long to produce them. The other was to take them by force and strategy from someone else. Now there are visions of a third way. Science, says Compton, creates new wealth. And while science cannot remove ambition and envy from human beings, it can outmode wars between the "haves" and the "have-nots." It can supply nations with substitutes for natural products at a cost far less than war. Herein lies a strong ray of hope for the future. When the masses of the people learn that they can secure the goods they need without recourse to force, it must follow that they will begin to think and act in new ways.

In our science classes we might begin by stressing the international character of science. So deep are these roots struck that neither wars nor revolutions can uproot them. To be sure, during wars science is necessarily partisan but, as Raymond Fosdick points out in a recent *Rockefeller Foundation Report*, this is a perversion of its real character. Says Fosdick: "When the war is done, men will again have access to all knowledge, wherever it may be found, and armed guards will no longer protect the secrets of research that might bring health and a better life to the race. Laboratories surrounded by barbed wire are ugly monuments to the intellectual and moral distortion of our times. For of all the activities of men, science and learning are most truly international."

As exponents of science we are naturally proud of the accomplishments of American Science in this war. Long before Selective Service, American scientists had made a voluntary registration of their talents and were launched upon their unmatched record in winning the

* Address at the Regional Meeting of the National Association of Biology Teachers, Pittsburgh, Pa., July 4, 1944. Some parts omitted.

Dr. Jeffers is at present on leave from Farmville to direct a survey of the Chesapeake Bay Resources for the *General Education Board* of the *Rockefeller Foundation*.

war. Did I say *American Science?* That in itself is a misnomer, for science knows no boundaries. Mustard gas came out of the German dye industry, but so did the sulfa drugs. Today the emphasis is upon what mustard gas represents; tomorrow upon the sulfa drugs, penicillin and the like.

The naming of plants and animals should take on added significance in times like these. At the International Botanical Congress held in Vienna in 1905, it was possible to reach substantial agreement on the controversial subject of plant names. There is a similar Code of Zoological Nomenclature. Both plant and animal codes are based primarily upon the tenth edition of the *Systema Natura* of Linnaeus, published in 1758. Hence, our enemies may choose to call men swine or dogs, but in biology classes the world over man is still *Homo sapiens* and the dog is *Canis familiaris* whether it be a German police, a Scottish terrier or a French poodle. Furthermore, whatever be the color of their skin, all men (everywhere, as Mr. Roosevelt puts it) belong to the same biological species. This is a very good time for a lesson on biological nomenclature.

It is an even better time for the study of diseases with an international flavor. "Spanish" influenza lost its nationalistic name when it became a pandemic following the last world war. It struck down friend and foe alike with frightening impartiality. Yellow fever is another such disease. The entire United States army is to be vaccinated against yellow fever against which nature imparts neither national nor racial immunity. While we are about it, we might seek to correct an erroneous impression that has crept into some of our history books to the effect that the French could not build the Panama Canal. As a matter of fact the French were master canal builders, having just completed the Suez Canal where shifting sands made the job doubly difficult. In Panama the French could not compete with insects and disease, and not until Walter Reed and his associates had paved the way could American engineers build the canal.

If diseases that have made history be our topic, surely we must give some attention to war's sixth column—the deadly typhus. In all great wars this disease has exacted a greater toll than gunfire. For elaboration the reader is referred to books of the type of Zinsser's *Rats, Lice and History.* We have almost forgotten Guadalcanal, but the boys who made history there will not soon forget because the malarial parasites playing havoc with their blood corpuscles will serve as an unpleasant reminder. Each Pacific island has its own perils other than gunfire and the danger of introducing some of these tropical diseases into this country is something not to be lightly overlooked. "In relation to great scourges like malaria and influenza—as indeed to many other great perils—nations today are roped like Alpine climbers crossing a glacier: they survive or perish together."

Animals and plants are blissfully unaware of state lines. Accordingly, one important phase of international biology is the control of immigrant species. These immigrants, released from the pressure of their natural enemies, often run amuck and become pests. The English sparrow and the starling in this country, and the rabbit in Australia come instantly to mind, but the list could be indefinitely extended. It is said that of the fifty most serious insect enemies of American agriculture more than three-fifths are immigrants. Every biology text contains a list of such pests. The Hessian Fly came from Europe as did also the Codling Moth, the Gipsy Moth and the Brown-tail Moth; the Chinch Bug came from Tropical Amer-

ica; the Boll-weevil and the Mexican Bean Beetle from Mexico; the San José Scale from Japan; and the Cottony Cushion Scale from Australia. But, like lend-lease, the traffic has not been all one-sided. The exchange of bugs has been international. We sent the Grape Phylloxera from New England to France whence it spread into Spain, Portugal, Switzerland and Italy. Our Colorado Potato Beetle went first into France and then into Germany.

Neither has the exchange of organisms always been an unprofitable transaction. Sir Walter Raleigh may be said to have started it, but it is still good business. As in the case of some of our literature and other native American products, Europe also appreciated the tomato first, while Americans did not generally know it was good to eat until about 1850, and the first improved varieties came from France and England. The Indians of the region now called Peru domesticated from seventy to eighty different plant species, among them the potato—both Irish and Sweet, Maize or Indian Corn, probably the most ancient of all cereals, and cocoa. The lowly peanut of which more than $40,000,000 worth were consumed last year by the American people (plus the elephants in the zoos) is a native of Brazil and Uruguay. Tropical America gave the world the pineapple, the avocado, the guava. The pecan is a native of Southern United States and Mexico, and Columbus found the natives of the West Indies walking a mile, not for a Camel, but for cigars.

Cucumbers and muskmelons are believed to have come originally from India and watermelons from tropical Africa, while pumpkins and squash are of American origin. Peas apparently originated in Ethiopia, and the Israelites wandering in the wilderness complained bitterly to Moses because they had no onions. It is interesting that practically all of our widely used grasses are immigrants.

Of the introduced animals mention might be made of the large Japanese oyster in California waters; now a profitable oyster industry is established where formerly there existed a small one. That small mollusk, the periwinkle (*Littorina*), of the Atlantic Coast is neutral economically because in this country we have not cultivated a taste for it as have Europeans. The periwinkle was first reported from Halifax, Nova Scotia, in 1857. It now ranges southward to Delaware Bay where the warmer water probably checks its further spread.

Pelagic species present a special problem by virtue of the fact that they migrate. The fur seal, the whale, and various species of Pacific salmon are the property of no single nation and their protection is doubly difficult. For example, the Pribilof herd of fur seal had been reduced from an estimated five million seals in the late 1700s to about 100,000 in 1911. In that year the United States, Russia, Great Britain (representing Canada) and Japan signed the North Pacific Sealing Convention. By 1934 the herd had increased to 1,125,000, and Japan alone was averaging $75,000 a year in pelt receipts without lifting a harpoon. It is not so well known that just two months before Pearl Harbor, Japan abrogated this treaty which had given three decades of protection to seals and thereby left another baby on the doorstep of those who will make the peace terms with that country.

Of all the nations engaged in whaling only the Japanese would not sign the treaty concluded at Geneva in 1931 looking to the conservation of whales. Up to the outbreak of the war Japan was slaughtering around ten or twelve thousand whales annually. Such a slaughter cannot be maintained after the war.

Japan, you must remember, is the greatest fishing and fish-eating country in the world. It was therefore natural

that among the concessions Japan secured by defeating Russia in 1904–05 was the right to operate canneries in Siberian waters until 1919. Only reluctantly has Russia granted short-timed renewals since, and some months ago she canceled the long-standing concessions over Sakhalin Island. It was in 1936 that Japanese fishermen turned in earnest to Alaskan waters. Japan finally was induced to sign a gentleman's agreement to stay on her side of the Pacific—to save both salmon and halibut from extinction. Thus the whole problem is again to end up in the lap of the peace makers.

The Migratory Bird Treaty Act of 1918 and the Migratory Bird Conservation Act of 1929 provide for the Federal administration of the migratory bird resources of the continent. During the year 1932 wild life refugees were started at strategic points on the waterfowl breeding grounds or flyways in twenty-one states. In contrast to the sordid record of Japan, it is suggested that high school pupils look up the record of Canada and the part she has played in protecting migratory birds to warrant this tribute from Dr. Ira N. Gabrielson, Director of our Fish and Wildlife Service: "Certainly the Fish and Wildlife Service could have asked for no more cooperation than Canada has always given it. She has been a good neighbor indeed."

Man is likewise a migratory species. Into this land of the free have flowed the brain and brawn of every race. At immigration ports our authorities decide who shall enter, who shall be debarred. Biologists cannot fail to note that the basis for entrance is often far from biological. Immigration laws look at the outward appearance, but biology looks at the inner make-up of the individual. The biologist would inquire into the kind of genes that the newcomer brings to be dumped into the melting pot of our great country. Animals and plants are quarantined at the border, but so far as is known no tests are applied to discover whether immigrant people are harboring certain intestinal parasites. Again, the relationship between animal and plant species and immigration itself has never been thoroughly explored. The potato famine of 1845 which caused large numbers of peasants to leave Ireland was in turn caused by a fungus. The slave ships brought both sorghum and hookworm as well as slaves.

Human culture has been forced to take to the road again in our own times. America has received an Einstein, an Iltis, and a Thomas Mann. America's gain has been Europe's loss, and Europe has lost much. The lights have gone out one by one in many of her institutions of culture. Libraries have been destroyed; scholars have been scattered or are dead. America has remained relatively unscarred. We still have books and periodicals and all of the other elements that contribute to culture. Our duty to the race would seem to be clear—to set aside a small surplus of the good things that we enjoy against the day when European and Asiatic cathedrals of learning shall rise again.

This has perforce had to be a hasty sketch. Many makers of history have of necessity had to be omitted, such as the beaver whose onetime importance is enshrined in the heroic traditions of the Hudson's Bay Company, or the humble cod which adorns the State House of Massachusetts. We have left out of consideration the things that men fight over—rubber, coal, oil, and other by-products of life on the earth. If animals and plants were given to verbal expression they might say, each to his own kind, as the twin Gods when questioned as they appeared to hearten the ranks of Rome: "By many names men call us; in many lands we dwell."

Reviews

BOOKS

BISHOP, SHERMAN C. *Handbook of Salamanders.* Comstock Publishing Company, Ithaca, New York. xiv + 555 pp. illus. 1943. $5.00.

A frequent job of the biology teacher is to identify specimens brought in by curious students who expect the teacher to have at least a speaking acquaintance with everything alive. Handbooks useful to the general biologist, however, have yet to cover some of the important animal groups.

With publication of Bishop's *Handbook of Salamanders*, another gap is filled. Following a summary of the biology and habits of salamanders, the book consists of identification keys and descriptive notes on all known salamanders of the United States, Canada, and Lower California. The extensive bibliography is conveniently arranged by states.

The treatment of each species follows a uniform pattern: *Type Locality, Range, Habitat, Size, Description, Color, Breeding,* and *Larvae.* Photographs, line drawings, and maps add to the value of the book.

To learn how this first complete guide to the salamanders is being received by specialists on the cold-blooded vertebrates, I questioned Dr. Reeve M. Bailey of Iowa State College. Besides giving it his highest praise, he reminded me that there is still much to learn about the habits and distribution of even the common species of salamanders. Teachers might add much worthwhile data by encouraging students to collect local specimens and send them, properly labeled, to some authority in the state concerned.

GUSTAFSON, A. F., GUISE, C. H., HAMILTON, W. J., JR., RIES, H. *Conservation in the United States.* 2nd ed. Comstock Publishing Company, Inc., Ithaca, New York. 477 pp. illus. 1944.

When a critic quibbles over small details, he is reviewing a good book. So to get this part of it over—the bibliography might have included some of the better educational films on conservation; and the magazine *Bird Lore*, which has changed names since the first edition of this book, might have been called *Audubon Magazine.*

The authorship—including a soil technician, forester, zoologist, and geologist—illustrates the wide scope of the conservation problem today. Further, it breaks the book into topical sections which for actual class work should be related to one another by supplementary reading and discussion. For in functional conservation soil science, forestry, wildlife management, and wise use of minerals are intimately bound together.

An effective student project in the use of this fine source book would be to show how the wise use of soils is related to sustained yield of forests, how trees effect wildlife, how animals in turn affect the environment which sustains them, and finally how the management of renewable biologic resources is related to conservation of those which are not renewable such as coal and iron. It's an angle that should challenge postwar planners, young and old.

LT. (JG) RICHARD F. TRUMP,
On leave from *Ames Senior High School, Ames, Iowa*

HOERR, NORMAND L., ET AL. *Frontiers in Cytochemistry.* Biological Symposia, Vol. X. Jaques Cattell Press, Lancaster, Pa. vii + 334 pp. illus. 1943. $3.50.

This volume of *Biological Symposia* is a summation of what is known about several phases of the chemical and physical organization of cytoplasm. It is the fruition of many years of work by investigators who were taught and inspired by Professor R. R. Bensley, and who conducted the symposium in his honor. As a source of information it is invaluable to all who desire the latest first-hand information about protoplasm. But more than that, it is inspirational in that it shows the tremendous influence of the able teacher and the marked appreciation of those who were fortunate enough to have been under his tutelage or who were inspired to develop their ideas along the lines he so ably pointed out. The book is profitable reading for any serious biologist.

BROTHER H. CHARLES, F. S. C.
St. Marys College, Winona, Minnesota

JEAN, FRANK C., HARRAH, E. C., AND POWERS, S. R. *Man and his Biological World.* Ginn and Co., New York. viii + 630 pp. illus. 1944. $3.50.

The 23 chapters of this book are arranged in nine units, which have titles of about a dozen words each, but are essentially as follows: 1. Nutrition, 2. Reproduction, 3. Adaptation, 4. Disease Control, 5. Metabolic Cycles, 6. Balance of Nature, 7. Evolution, 8. Heredity, 9. Cultural Development. The unit organization seems rather artificial, and nothing seems to be gained by the excessively long titles; however, these are minor peeves

that really do not matter in a book that is in general an excellent one. The illustrations, both photos and drawings, are unusually good. There are from 10 to 20 questions for study at the end of each chapter, and about the same number of references, with specific page citations, consisting of both books and periodicals. The glossary is fairly complete, and the index is well organized. This is a college text, but it can easily be read by the intelligent high school student, and should find wide distribution in high school libraries and reference shelves.

JOHN BREUKELMAN

FILMS

A SERIES OF NINE FILMS, devoted to the study of zoology, embryology and botany, and of special interest to teachers and students of these subjects, is available through the *British Information Services*, Film Division, 30 Rockefeller Plaza, New York 20, N. Y. The films are as follows:

THE AMOEBA. It shows the structure and function of a single-celled animal of a very primitive type and illustrates the study of protoplasm and cells, including energy relations, response to stimuli, and reproduction. 9 minutes. Rental 50¢.

THE BLOWFLY. The life cycle of the housefly, with a visual explanation of wing expansion and final coloring and hardening of skin. 18 minutes. Rental 75¢.

THE FROG. Study of its composition by dissection, spermatozoa, coition, fertilization, development of eggs and the process of segmentation. The embryo stage, and complete development from tadpole to its final form. 17 minutes. Rental 75¢.

THE EARTHWORM. Digestive, circulatory, excretory and reproductive systems are stressed, and there are moving diagrams of the processes of coition, subsequent egg-laying and cocoon formation, ending with the birth of young worms. 18 minutes. Rental 75¢.

THE DEVELOPMENT OF THE TROUT. The eggs, with a close view of unfertilized egg-cell showing composition, their fertilization and development. The embryo stage progressively shown, and the varied stages of development from hatching to final adult form. 16 minutes. Rental 75¢.

THE SEA URCHIN. The development of the pluteus larva shown in actual photographs assisted by explanatory animated diagrams. The feeding and growth of the four, six and eight-armed stages. 25 minutes. Rental 75¢.

THE DEVELOPMENT OF THE CHICK. The structure of the egg described by diagram, the blastoderm and embryo stages illustrated by close-view and speeded-up photography, and development after hatching up to 7–8 months. 23 minutes. Rental 75¢.

LIFE CYCLE OF A PLANT. The growth is shown by means of speeded-up photography, and structure of flower is described by enlarged model and explained in detail. Also illustrated by moving diagrams or dissected studies are the mechanics of flower, cross pollination, germination, fertilization and development of speed pod. 11 minutes. Rental 50¢.

HEREDITY IN MAN. Combining the use of charts and actuality, the law of differential fertility is described. Illustrations are given of the inheritance of beneficial characteristics in families, and the case history of a family of 17 children with a normal mother and an apparently normal father with defective relatives is used as an example of inheritance of defect. 14 minutes. Rental 50¢.

Besides the central depository named above, there are regional depositories at Washington, D. C., Chicago, Hollywood and New Orleans. The films may also be obtained from a number of cities where there are consular offices. Complete information may be obtained from the New York office.

RECENT PUBLICATIONS

KEELER, CLYDE E., *Organic Evolution, A Genetic Phenomenon.* Edgewood School Press, Greenwich, Conn., 1944, 25 pp. 60c.

A popular account of the mechanics of evolution, as presented in the biology classes in the Edgewood School. Analysis of the factors in evolution, with special reference to the heredity and embryological development of the individual. Illustrated with drawings, both technical and of the "cartoon" type.

HEIDGERKEN, LORETTA, *Selected Films for Biological and Physical Sciences in Schools of Nursing*, Educational Film Library Association, 45 Rockefeller Plaza, New York 20, N. Y., 1944, 50c.

A 37-page pamphlet, summarizing 28 important films (Alimentary Tract, Bacteria, Body Defenses, Catalysis, Colloids, etc.) of importance in the training of nurses. Each film is appraised from the standpoint of this particular use. There is a bibliography and a directory of educational film libraries.

DARBAKER, L. K., *Poisonous Plants of Western Pennsylvania*, and *Some Medicinal Plants of Western Pennsylvania.* School of Pharmacy, University of Pittsburgh. Mimeographed outlines, 5c each.

Alphabetical check-lists of plants, including both scientific and common names, the

former with remarks concerning the parts that are poisonous, nature of the poisonous effect, and the like. The latter, being strictly a check-list would be of less use to non-residents of the area indicated.

THE HARVARD APPARATUS COMPANY, THE AMERICAN JOURNAL OF PHYSIOLOGY AND DR. W. T. PORTER

The undersigned, having on the request of W. T. Porter assumed the guidance of the Harvard Apparatus Company, wish to place on record Dr. Porter's unique services to Science. Some forty-five years ago, when there was scant if any laboratory teaching of physiology in our colleges and universities outside the medical schools, and laboratory teaching of physiology in medical schools was just emerging, he saw the probable importance of rendering available to our colleges, universities and medical schools good apparatus at the lowest possible cost for the laboratory teaching of physiology. He started the Harvard Apparatus Company as a private corporation, partly on borrowed funds. This business has been conducted by Dr. Porter in the public interest, and without commercial profit. When there was a modest annual surplus, this was used: (a) to improve production equipment, (b) to provide a pension fund for the Company's employees, (c) and to finance the *W. T. Porter Research Fellowship in Physiology*, administered by the Council of the AMERICAN PHYSIOLOGICAL SOCIETY.

In 1934 the Harvard Apparatus Company was reorganized as a non-profit corporation under the laws of the State of Massachusetts "for the promotion of teaching and research in physiology and its allied sciences." Dr. Porter gave to this corporation all property owned by the private Harvard Apparatus Company corporation. He has received no salary for his services to the corporation. We intend to follow Dr. Porter's example, with (we hope) some of his efficiency and vision. In recent years the services to the sciences of functional biology rendered by Dr. Porter within our own borders have been extended to many other countries. The services of the Company can be further extended to the liberal arts colleges, junior colleges, and high schools where experimental physiology has not yet been introduced as an element of a liberal education, a forward step in the education of tomorrow, probably in the cards.

Forty-six years ago Dr. Porter founded *The American Journal of Physiology* (for the publication of research), and for 16 years he carried the entire financial responsibility and editorial burden for the first 33 volumes, that is, until 1914, when Dr. Porter presented this Journal (including back volumes in stock) as a gift to the AMERICAN PHYSIOLOGICAL SOCIETY.

These are significant services to science and to our fellow men. They call for more than a passing note, as they echo and amplify the voice of the English chemist, James Smithson of a hundred years ago, whose vision of science, whose faith in man, and whose material wealth established the Smithsonian Institution of Washington, "*for the increase and diffusion of knowledge among men.*"

A. J. CARLSON,
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WALTER E. GARREY,
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Stanford University
MAURICE B. VISSCHER,
University of Minnesota

THE FUTURE OF PHARMACY

The war has caused a shortage of pharmacists in every American community, according to a recent survey, and unless more young people are attracted to the profession of pharmacy in the next few years, the services of the neighborhood drug store, for so many years an integral part of American life, will be impaired and, what is more important, public health will suffer. Hospitals, too, are feeling the pinch, along with drug and pharmaceutical manufacture and research.

The primary interest, however, to educators is the situation facing colleges of pharmacy as a result of the shortage. A great many may have to close their doors unless additional students are enrolled. Careful surveys indicate that the shortage of practicing pharmacists can be conservatively estimated at 6,500 by January, 1946, and this estimate is made assuming the return to pharmacy of 10,000 of the 14,000 pharmacists now in the armed services. At present, it cannot be forecast accurately how much greater this shortage will be because of the number that may be required for an expanded Army, a world-wide U. S. Navy or for important work in rehabilitation centers for the wounded. However, the most startling factor of all is the downward trend of replacements. Pharmacy student enrollments have dropped from a normal of 8,800 to 2,700 in the spring of 1944. Only 800 will gradu-

ate in 1944, while between 200 and 300 can be expected to graduate in 1945, and in succeeding years till the war's end.

The practicing pharmacist always occupied a place of special trust in the American community because he is a trained man, and because his profession brings him into personal and often intimate contact with every man, woman and child in his community. Year by year, progress in medical science, sanitation and chemistry broadens the services performed by the profession of pharmacy, and increases the opportunities offered the student. What are these opportunities? The profession of pharmacy requires high school education. It offers the serious and ambitious student many exceptional opportunities in the postwar era. The labor market will be glutted with ex-service men competing for jobs but pharmacy will be free of any overcrowding.

The National Pharmacy Committee, 620 Fifth Avenue, New York 20, N. Y., will gladly supply teachers or educational organizations with information on this subject, and has published an interesting booklet, sent free upon request, "Your Future in Pharmacy."

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